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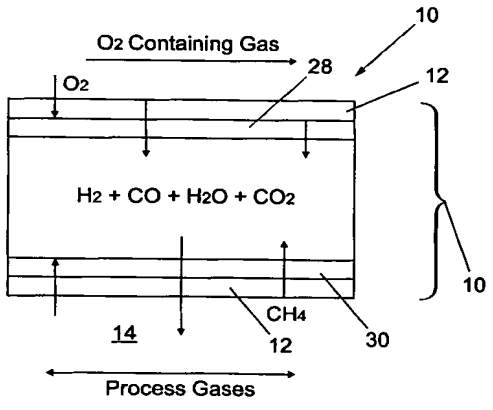
(54) Title: A MEMBRANE APPARATUS AND METHOD OF PREPARING A MEMBRANE AND A METHOD OF PRODUCING HYDROGEN



(57) Abstract: The present invention discloses a method, apparatus and method of manufacturing an apparatus; all to produce hydrogen gas, particularly synthesis gas. Preferred embodiments of the invention include an alpha alumina membrane which has been treated with a TiO_2 wash coat on one side and has an active gamma alumina layer on an opposite side. A metal catalyst, preferably rhodium, is deposited within the pores of the alumina. Oxygen travels through the membrane and is activated before contacting methane on the other side of the membrane and forming synthesis gas through partial oxidation of the methane. Embodiments of the invention have a number of benefits including the high conversion rate of oxygen (100 %), the separate feed streams of methane and oxygen which allow for optimal ratios to be used without danger of explosion, and the opportunity to vary the feed rates without changing the products formed. Normally gaseous hydrocarbons recovered from remote oil wells (e.g. offshore oil wells) can thus be converted to synthesis gas and then to normally liquid hydrocarbons via a Fischer-Tropsch type reaction. The normally liquid hydrocarbons are easier to transport away from the remote oil well than normally gaseous hydrocarbons.

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